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5 SPECIFICATION.DOC

CompareRite found 109 change(s) in the text

10 Deletions appear as Overstrike text surrounded by {}  
Additions appear as Bold text surrounded by []

[Substitute Specification:]

~~{Method and circuit arrangement for confirming the serviceability and correct use of connecting cables in a switching device}~~ [METHOD AND CIRCUIT ]

5 ~~{The invention relates to a method and a circuit arrangement for confirming the serviceability and the correct use of switching units of a switching device with the aid of connecting cables which connect plug connections to one another by emitting test signals to one of the ends of the relevant connecting cables and by evaluating the}~~ [FOR CONFIRMING SERVICEABILITY

10 AND CORRECT USE OF CONNECTING CABLES IN A SWITCHING DEVICE

### BACKGROUND OF THE INVENTION

Field of the Invention:

15 The present invention generally pertains to fault detection, and in particular to fault detection in connecting cables of switching devices.

Discussion of the Related Art:

In order to evaluate] output signals which occur at each of the [ends of ]{~~other ends of the relevant connecting cables.~~

20 In order to allow the evaluation, mentioned above, of the output signals which occur at each of the other ends of the} tested connecting cables {~~to be carried out~~}, a separate evaluation procedure and, {~~linked to this,~~} a separate evaluation circuit are normally required in the switching units connected {~~there. There is now a requirement for this additional complexity to be reduced, or even to be avoided.~~} [thereto. There has long  
25 been a need to reduce or avoid this complex process.]

{~~The invention is accordingly based on the object of}~~ [The present invention is based on ]indicating a way in which, {~~in the case of a method and a circuit arrangement of the type mentioned initially,~~} the serviceability and the correct use of switching units of a switching device can be confirmed in a relatively simple manner with less effort than  
30 before, with the aid of the connecting cables which connect plug connections to one another.

{

The object mentioned above is achieved, according to the invention and in the case of a method of the type mentioned initially, in that when using switching units with  
35 fault monitoring devices which respond to specific faults in the transmission signals, transmission signals which have such faults are transmitted as test signals via said connecting cables.

~~The~~ **[The present]** invention is distinguished by the ~~{advantage}~~ **[fact]** that it involves virtually no additional monitoring effort since it makes joint use of fault monitoring devices, which are normally present in any case in the switching units, for confirming the serviceability and the correct use of ~~{said}~~ **[the]** connecting cables.

5            Faulty synchronization signals are preferably used as transmission signals having faults. This allows synchronization fault monitoring devices[, ] which exist in the switching units[, ] to be jointly used ~~{in a particularly simple manner}~~ for confirming the serviceability and the correct use of said connecting cables.

             Corrupted synchronization signals of ATM information signals are preferably used  
10 as transmission signals having faults~~{}~~ **[because]** ATM switching devices make use of this measure in an advantageous manner.

             The method according to the **[present]** invention is ~~{expediently}~~ carried out using a circuit arrangement in a switching device, which contains switching units ~~{which are}~~ connected to one another by means of plug-in connecting cables~~{, in which case the}~~ **[**.

15 **The]** switching units of ~~{said}~~ **[the]** switching device are equipped with fault signaling devices which emit fault reporting signals when specific faulty transmission signals occur.

~~{According to the invention, this circuit arrangement is characterized in that a test device is}~~ **[The circuit according to the present invention, involves a test device**  
             **]connected to the switching units of the switching device[, ] which are [in turn] connected**  
20 to one another by means of the connecting {

             }cables~~{, which}~~ **[. The]** test device emits transmission signals, corrupted by faults, as test signals to ~~{the one}~~ **[a first]** set of switching units of the switching device, and which checks the other switching units~~{, which}~~ **[. The other switching units]** are connected to the first ~~{mentioned}~~ **[set of]** switching units via the connecting cables, for  
25 the occurrence of fault reporting signals. ~~{This results in the advantage that}~~ **[Therefore,]** no additional circuitry complexity whatsoever is required in the switching units of the switching device~~{;}~~ **[. Instead,]** all that ~~{need be provided}~~ **[is needed]** is the test device, which is required in any case.

~~{Said}~~ **[In addition, the]** test device can preferably be connected via separate  
30 connecting lines to the switching units ~~{which are}~~ connected to one another by means of

the connecting cables. ~~{This results in the advantage that}~~ [Thus,] the relevant test device can be used in a very particularly simple manner.

~~{The invention will be explained in more detail in the following text using an exemplary embodiment and with reference to the drawing.}~~ **[SUMMARY OF THE**

5 **INVENTION]**

~~{The lower part of the drawing}~~ [It is an object of the present invention to provide a method and circuit for confirming the serviceability and correct use of switching units of a switching device

10 It is another object of the invention to provide a method and circuit for confirming the serviceability and correct use of switching units of a switching device with the aid of connecting cables which connect plug connections to one another by emitting test signals to one of the ends of relevant connecting cables.

15 It is a further object of the invention to provide a method and circuit for confirming the serviceability and correct use of switching units of a switching device by evaluating the output signals which occur at each end of the relevant connecting cables.

20 It is yet another object of the present invention to provide a method and circuit for confirming the serviceability and correct use of switching units, including fault monitoring devices which respond to specific faults in transmission signals, such that any signals having such faults are transmitted as test signals via the connecting cables.

25 These and other objects of the invention will become apparent upon careful review of the following detailed description of the presently preferred embodiments, which is to be read in conjunction with a review of the accompanying drawing figures.

**BRIEF DESCRIPTION OF THE DRAWING**

Figure 1 shows a cable connection arrangement according to the present invention.

## DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

**Figure 1]** shows two device blocks DB1 and DB2 of a switching device, which  
5 each have a series of switching units SU11, SU21, SU31~~{,},~~ SU12, SU22[, ] and SU32.  
These switching units are connected to one another with the aid of plug connections via  
multicore connecting cables C1, C2 and C3~~{, respectively,}~~. The fact that the relevant  
connecting cables have a number of cores is in this case indicated by a short oblique bar  
crossing the respective connecting cable. At the device block DB1 end, the plug  
10 connections comprise firstly plug sockets SO11, SO21 and SO31, respectively, and at the  
device block DB2 end, the relevant plug connections comprise plug sockets SO12, SO22  
and SO32.

~~{The connecting}~~ **[Connecting]** cables C1, C2 and C3, ~~{respectively,}~~ are inserted  
into these plug sockets with the aid of plugs CON11, CON21, CON31, CON12, CON32  
15 and CON22~~{, respectively,}~~. {

}Here, a test circuit TC is connected via connecting lines, which each comprise a  
number of individual lines, to the switching units SU11, SU21 and SU31 of the device  
block DB1[, ] and to the switching units SU12, SU22 and SU32 of the device block DB2. In  
the case of the switching units SU11, SU21 and SU31, ~~{these}~~ **[the]** connecting lines are  
20 indicated by a single connecting line TL marked by a short oblique bar. In the case of the  
switching units SU12, SU22 and SU32, the relevant connecting lines are indicated by a  
single connecting line RL, likewise marked by a short oblique bar. [

**]Test** signals can be emitted via ~~{the}~~ line TL from the test circuit TC to separate  
inputs of the switching units SU11, SU21 and SU31. Evaluation signals can be received  
25 by the switching units SU12, SU22 and SU32 from the test circuit TC via the line RL. In  
the present case, these evaluation signals, as will be described below in more detail, are  
formed by fault reporting signals, which can be checked by separate fault signaling  
registers R12, R22 and R32, respectively, in said switching units SU12, SU22 and SU32~~{,~~  
~~respectively,}~~[, ]

30 ~~{In the present case, the already mentioned test}~~ **[Test]** circuit TC has a  
microprocessor MP ~~{which is}~~[, ] connected via a multicore bus line BUS to a program  
memory ROM, to a random access memory RAM which is used as the main memory, to a  
control and display unit OD[, ] and to two interface devices IF1 and IF2, to which the lines

TI and RL, ~~{respectively, mentioned above,}~~ are connected. ~~{The multicore}~~ **[Multicore]** bus line BUS, whose multicore nature is indicated by a short oblique bar crossing each of the individual lines, can be subdivided into an address bus line, a data bus line and a control bus line.

5            Now that the construction of the circuit ~~{arrangement illustrated in the drawing}~~ **[of Figure 1]** has been explained to the extent necessary for understanding {  
}of the present invention, the method of operation of this circuit arrangement will now be described.

             As stated above, the aim of the invention is to confirm the serviceability and the  
10       correct use of connecting cables, with respect to ~~{the exemplary embodiment of the}~~  
connecting cables C1, C2 and C3 illustrated in ~~{the drawing. In this case, it}~~ **[Figure 1. It]**  
is assumed that the relevant connecting cables are used correctly, that is to say are  
connected, when they ~~{respectively}~~ connect the plug socket pairs SO11 and SO12, SO21  
and SO22, as well as SO31 and SO32 to one another. This means that only the  
15       connecting cable C1 is connected correctly in ~~{the conditions illustrated in the drawing}~~  
**[Figure 1].**

             In order to obtain ~~{the previously mentioned}~~ confirmation ~~{now, the}~~ **[of correct connecting]** switching units SU11, SU21 and SU31 are supplied with test signals from  
~~{the test circuit TC. In the present case, transmission signals having faults are in this case}~~  
20       ~~used as test signals, to be}~~ **[test circuit TC. Transmission signals having ]**precise  
specifically faulty synchronization signals ~~{, in}~~ **[are used as test signals. In]** the situation  
where messages in the form of ATM signals are transmitted in the switching device, these  
synchronization signals may be contained in ~~{these}~~ **[the]** ATM signals.

             The faulty transmission signals ~~{mentioned above}~~ are transmitted via ~~{the}~~  
25       connecting cables C1, C2 and C3 to ~~{the}~~ switching units SU12, SU22, SU32 which are  
part of the device block DB2~~{, these}~~**[. These]** faulty transmission signals are identified in  
the fault monitoring devices there, and corresponding fault reporting signals are then  
immediately stored in associated fault signaling registers R12, R22 and R32, respectively.  
By appropriate checking of these fault signaling registers R12, R22 and R32, it is thus  
30       possible to confirm in ~~{a simple manner in}~~ the test circuit TC whether **[or not]** the faulty  
transmission or synchronization signals supplied as test signals {

}to the individual switching units SU11, SU21 and SU31~~{, respectively,}~~ in the device block DB1 ~~{also}[,]~~ result in ~~{the}~~ desired fault triggering in ~~{the desired}~~ switching ~~{unit}~~ **[units]** SU12, SU22 and SU32~~{, respectively,}~~ in the device block DB2.[

5       ]For example, ~~{this is the case for the}~~ connecting cable C1 ~~{which}~~ is the correctly connected connecting cable in the exemplary embodiment. In the case of the connecting cables C2 and C3, ~~{the}~~ fault reporting signals do not occur in the respectively desired switching units SU22 and SU32~~{, respectively,}~~ in the device block DB2[,]

10       since these are ~~{the}~~ two incorrectly connected connecting cables~~{, but occur interchanged, that}~~[. **In this example, cables C2 and C3 are incorrectly connected interchangeably. That]** is to say in the switching units SU32 and SU22, respectively. [

15       ]This is identified in the test circuit TC, by which ~~{means}~~ the incorrect use~~{, that is to say the}~~ **[or]** incorrect connection of the connecting cables C2 and C3, can be identified. Thus, ~~{here,}~~ the occurrence of the fault reporting signals at the respectively desired point is ~~{in this case}~~ used as a positive indication of correct use of the respective connecting cable.

20       The procedure explained above means that it is now not only possible to determine correct use, that is to say correct connection of the connecting cables, but, ~~{furthermore,}~~ the serviceability of the respective entire connecting cable can also be confirmed. To do this, ~~{said}~~ test signals are transmitted, preferably successively, via the various cores of the respective connecting cable.

25       Finally, it should also be mentioned that the **[present]** invention can be used not just in the one transmission direction between switching units of a switching device ~~{which can be}~~ connected to one another by ~~{means of a}~~ plug-in connecting cable, but can also be used, if required, in the opposite transmission direction.

25       **[Although modifications and changes may be suggested by those skilled in the art to which this invention pertains, it is the intention of the inventors to embody within the patent warranted hereon all changes and modifications that may reasonably and properly come under the scope of their contribution to the art. - -]**

**[ - - ABSTRACT OF THE DISCLOSURE**

**A method]** {Method} and circuit {arrangement} for confirming the serviceability and correct use of {connecting cables} **[switching units]** in a switching device[, **using connecting**  
5 **cables which attach plug connections to one another. Transmission)]**{

~~In order to confirm the serviceability and the correct use of switching units (SU11, SU21, SU31, SU12, SU22, SU32) in a switching device (DB1, DB2) with the aid of connecting cables (C1, C2, C3) which connect plug connections (SO11, CON11, SO21, CON21, SO31, CON31, CON12, SO12, CON32, SO22, CON22, SO32) to one another,~~  
10 ~~transmission}~~ signals which have faults are emitted as test signals to one of the ends of the connecting cables{(C1, C2, C3) and fault}[. **Fault]** monitoring devices{(R12, R22, R32)}, which respond to such faults in transmission signals, {are used for} emitting fault reporting signals{, which}[. **The fault reporting signals]** can be evaluated{,} in the  
15 switching units[,] which are connected to the other ends of the connecting cables[. - - ]{(C1, C2, C3).

Drawing}